

II. IT Services Environment Description

Communications

Provide description of your Center's communications system including, regardless of use, all: LANs up to the WAN/ISP interface, cable plant, voice systems, audio/video systems (ViTs, as provided via the WAN, not included), FAX/pager systems, remote communication, and RF/wireless systems (including, when available, a 'logical' or physical graphic representing the described communications system.) Include in your description the nominal bandwidth provided to desktops, protocols in use, firewalls and other security features (proxies, authentication) and high speed or high bandwidth requirements.

Physical Plant. The Headquarters building comprises nine floors plus a concourse level. Floor 2 is leased to HUD and is not supported today except for telephone lines. Floor 3 is leased to the Department of Agriculture. Each floor has three large wiring closets with separate air conditioning. Most of the building has a 3" raised floor over a concrete sub-floor. All power, network, and cable television wiring is run under this floor. Distribution boxes (referred to as "WIO boxes") are embedded in the floor to provide connection and power to user workstations. Power boxes are separate from network boxes.

Each network box contains six outlet positions. The outlets accept different inserts to provide outlet jacks for RJ-45 or other media (i.e., fiber, 3270 coax) in the office flooring which is raised 4 inches. Each box is equipped with at least four outlets; one for a phone, two for data, and one, optionally connected to an analog line, for miscellaneous use (usually a facsimile machine). All outlets are wired with four pair, Category 3 cable (Note: NASA HQ is planning to install Cat-5e cabling by 1st quarter 2000). Each cable terminates in an RJ-45 distribution panel mounted on a wall in the nearest wiring closet.

Each closet contains a rack mounted, Catalyst 5000 or 5500 switch. The Catalyst switches are wired to RJ-45 distribution panels which are mounted on the wall near the WIO box panels described above. RJ-45 patch cords are used to interconnect the concentrators to the WIO box outlets. Each Catalyst switch has two, 1 Gbit, multi-mode fiber runs that take separate, redundant paths to different center closet switches and then to the Concourse and NHCC switches. The Concourse and NHCC switches have separate routers to provide failover and failsoft capabilities. There is a border router to handle external to firewall, remote sites, and a service router handling internal to firewall, remote sites. The demarcation point to the wide-area networks are a pair of half-duplex, 100 mbs hubs. See the "LAN Infrastructure" below.

In addition to the Category 3 twisted pair cable, each floor has some multi-mode fibre-optic cable run to the WIO boxes which in general, is not used. The one exception is the Inspector General's office which has direct access to the wide-area internet service hub.

The building is also wired for distribution of cable television. Each floor has a single CATV leg with 10 tap boxes placed along the length of the building. Where CATV service is desired (e.g. in conference areas) a coaxial cable is run from the WIO box to the nearest available tap. A local vendor provides Cable.

TV service is via microwave. It is distributed to the NASA HQ television production area. Local programming is mixed with the CATV service and re-broadcast throughout the Headquarters wiring plant.

There is a pager repeater. This repeats the pager signal for in-building and Concourse level users.

LAN Infrastructure. Figure 1 shows the components of the current LAN infrastructure.

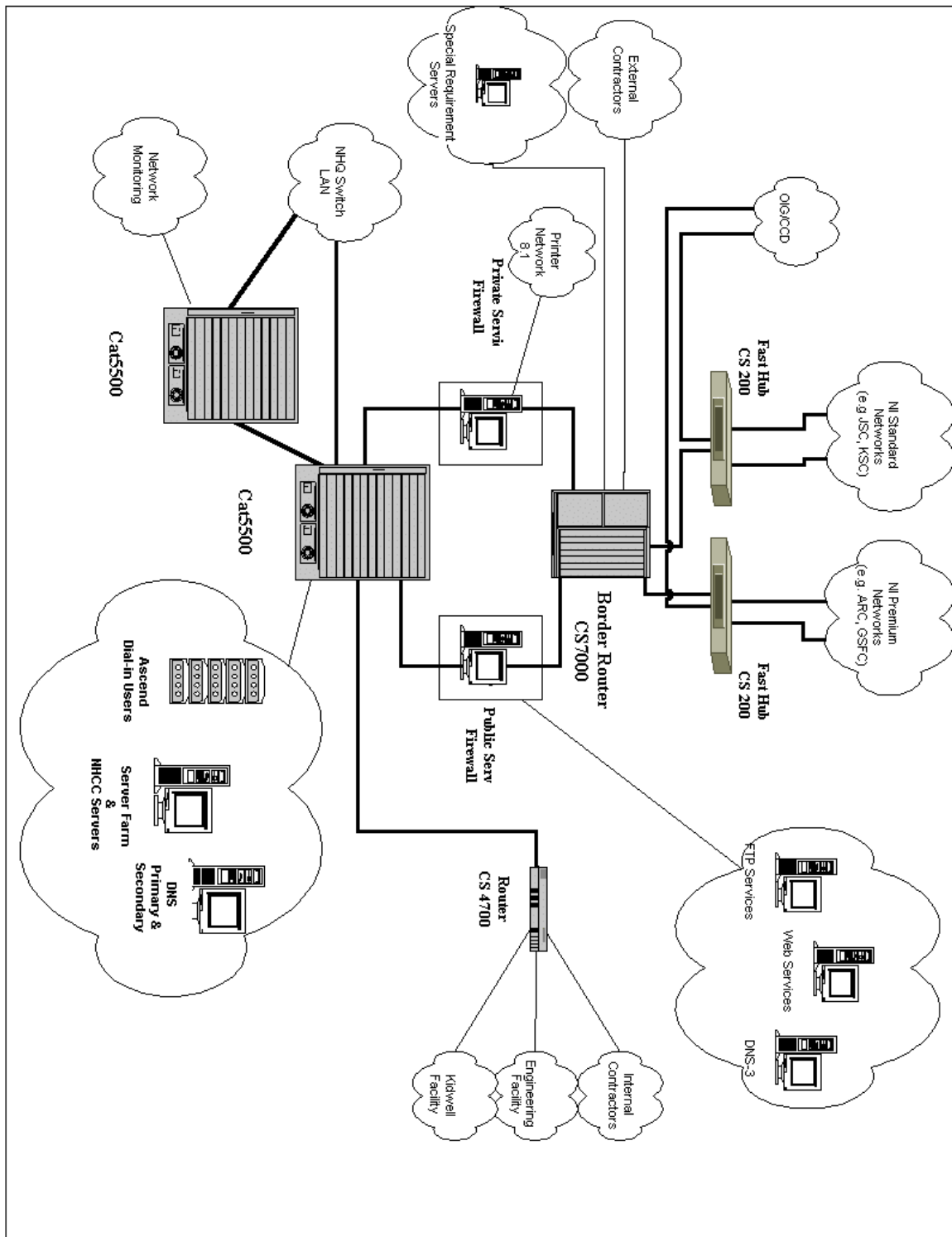


Figure 1. LAN Interconnections

The entry point into the HCN from external Internet Service Providers (ISP) is provided by the border router and two, 100 mbs, half-duplex hubs. The 100 mbs, half-duplex hubs are the demarcation for the wide-area network system. The border router in turn provides 12 individual networks:

- Premium Network. A network connection to the former, NASA Program Support Communications Network Internet (PSCNI), this is a closed network providing service to NASA Centers and partner sites.
 - NSI Interconnect Network. A network connection to the NASA Science Internet (NSI). This is an open network providing both Internet connectivity and access to various NASA Centers and partner sites.
 - Firewall Public Services the network interface for services that interface to e-mail, news, and other well-known, internet services.
 - Firewall Private Network interface for internal to NASA HQ access to and from internet and NASA network services.
 - Victim Network. A network provisioned to provide connectivity for external services offered by unsecured computer systems.
 - Offsite Contractor and non-Firewall networks. These networks provide access without firewall protection for off-site contractors and local users needed open access to the internet or other centers.
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- Virginia Ave transit network this sub-T1 serial line provides off-site access to a contractor at 400 Virginia Avenue.
 - Design Center transit network this sub-T1 serial line provide off-site access to a contractor at the Design Center building.
 - JPL 525 School St. Suite 203 this T1 serial line provides off-site access to a contractor on School Street.
 - SPF-0 network 10 mbs LAN provides unfiltered access to the internet.
 - Victim network 10 mbs LAN provides another, unfiltered network to the internet for non-critical services at NASA HQ.
 - Code-R Encryption Network 10 mbs LAN provides unfiltered network access to Code-R systems.
 - LAN for NASA WWW services provides 100 mbs LAN interface for NASA wide web services.
 - MBONE tunnel to new HCN this is a non-physical link providing wide-area, multicast services to NASA HQ.

The HCN proper connects to the border router through two firewall systems, Sun SPARC20s running firewall software. These firewalls also provide a Public Services network for e-mail, news, DNS, and other well known internet services.

Local area subnets behind the border router are managed by a Cisco Catalyst switch network. Within this network are a number of virtual LANs (VLANs) that provide IP subnet access to the codes and specialized networks.

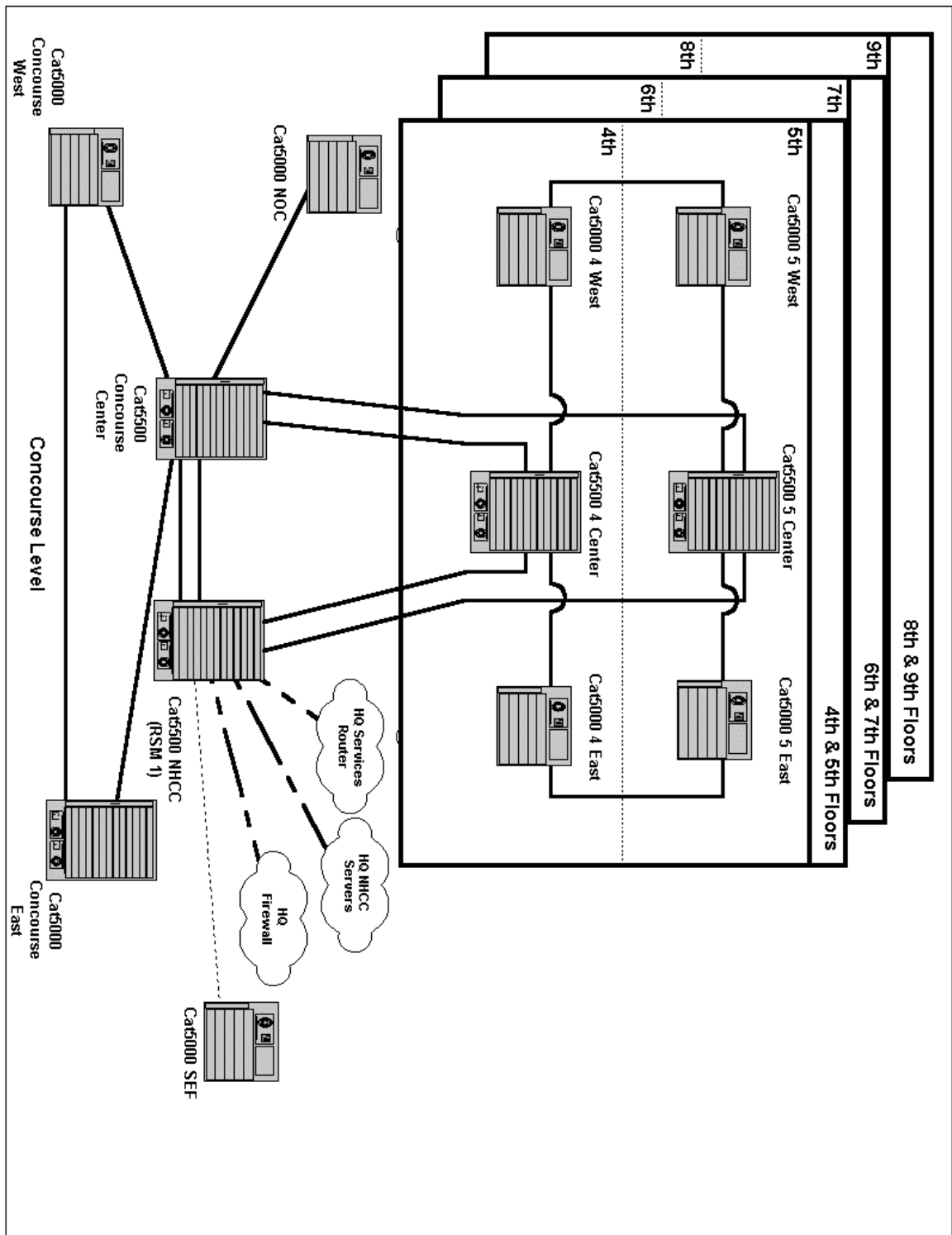


Figure 2 Local Network

The HCN also has an interface to the service router that provides IP and Appletalk connections to off-site contractor offices.

Remote Sites. All remote sites supported by the HCN are shown in Figure 1, and enumerated in Figure 3. The HCN does not support remote connectivity other than to specific program support contractors in the local metropolitan area.

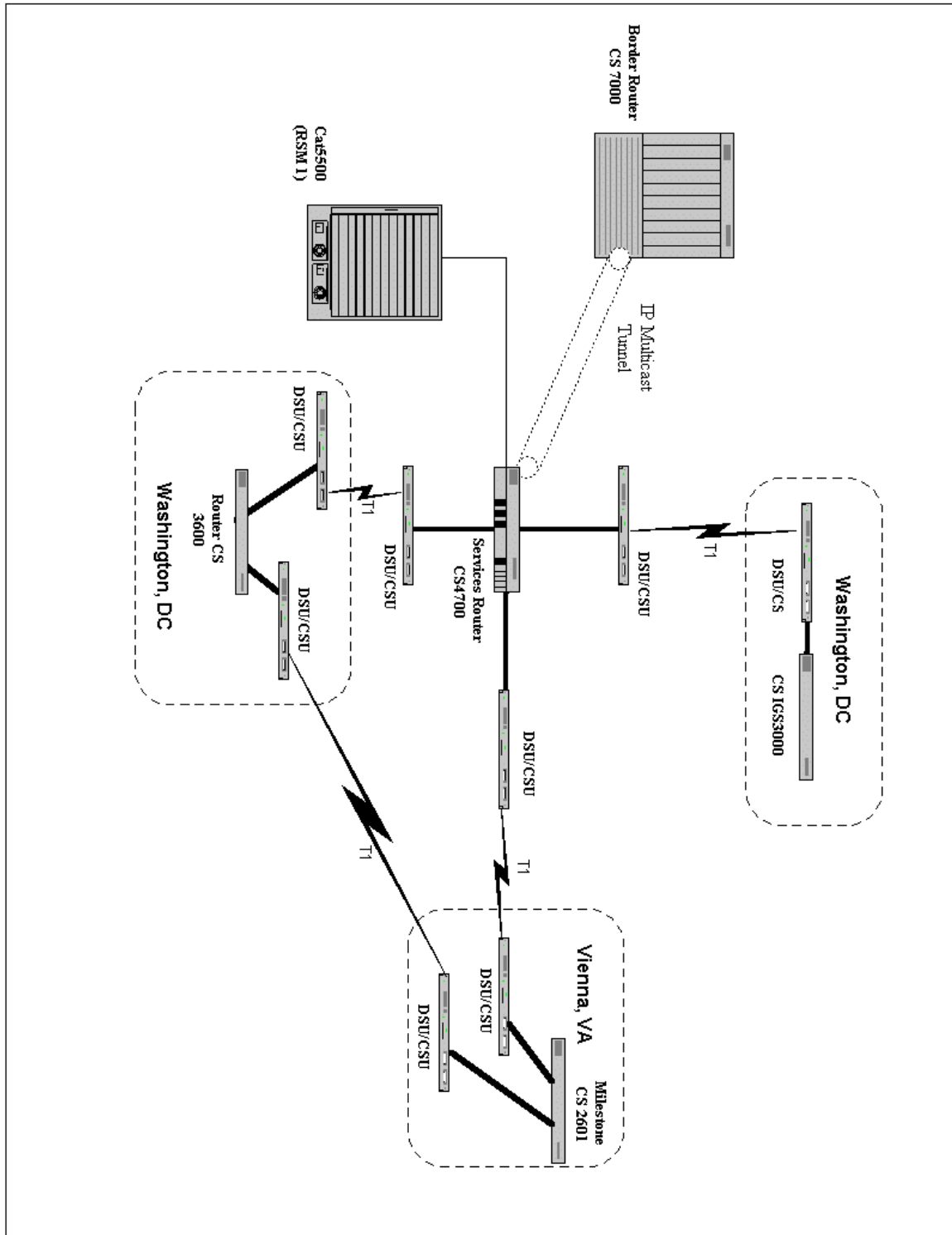


Figure 3: Remote Sites

Protocol Support. The HCN supports IP, IPX, and Appletalk. Appletalk zones and network numbers are chosen to conform to the Intercenter Committee for Computer Networks (ICCN) standards. Headquarters is currently migrating away from vendor-proprietary protocols (i.e. Appletalk, IPX) to a completely IP based infrastructure. While proprietary protocols may continue to be used within a Code they will not be used between Codes in the future.

Dial-In. Headquarters supports a dial-up system for its users away from the facility. Access to this system is restricted to Headquarters personnel and contractors providing direct support to Headquarters programs. The system is comprised of two Ascend Max 4004s, provisioned with three ISDN PRI circuits (23 B + 1 D per circuit) and 72 digital modems. This allows for a total of 69 concurrent dialup users (fewer if 2B ISDN is used). Addresses are dynamically assigned. An '800' number is available for users outside the Washington, D.C., local calling area.

Audio/Visuals. A number of HQ conference rooms use projection equipment that is computer controlled. The computers are maintained by Code CI.

Fax Machines. All fax machines at NASA HQ are furnished by PSCN/Marshall Space Flight Center as part of NISN.

- **Voice System.** Telephone service at HQ is via a CENTREX system provided by Bell Atlantic through the Washington Integrated Telephone System (WITS) contract with GSA. There are 2340 ISDN lines, 1118 analog lines, and 2400 ISDN telephone sets. The ISDN telephone sets consist of AT&T model ISDN 6504 and ISDN 6508 equipment.
- Also all communication closet have (1) NT1 power rack for interface for the ISDN 2B1Q multipoint phones lines and above mentioned phone models. Each NT1 is wired to 110 blocks which feed the users workstations. All east and west closets have 200 pair risers which are fed from the main phone room. This allows for expansion for each closet and redundancy if lines fail. The center closets have 400 pair risers that are fed from the main phone room. All closets are connected to one another on each floor thru 100 pair cables connected to 48 port patch panels. All closets are connected with 52 count fiber backbone to the main phone room. Finally each closet has 200 pair homerun cables which go directly to the main phone room for additional redundancy.
- HQ also uses 314 pagers and 66 cell phones. Voice mail service is provided by an Octel Overture 250 voice mail system, which is completely integrated via a 3A Translator with the ISDN desktop telephone service. An '800' telephone number is used for accessing the voice mail system when users are on travel.